U.S. NUCLEAR REGULATORY COMMISSION

# STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

## 12.1 ASSURING THAT OCCUPATIONAL RADIATION EXPOSURES ARE AS LOW AS IS REASONABLY ACHIEVABLE

REVIEW RESPONSIBILITIES

Primary - Radiological Assessment Branch (RAB)

Secondary - None

### I. AREAS OF REVIEW

The following areas of the applicant's safety analysis report (SAR) are reviewed as they relate to assuring that occupational radiation exposures (ORE) will be as low as is reasonably achievable (ALARA):

1. Policy Considerations

   a. Management policy with respect to designing and constructing the plant (preliminary safety analysis report, PSAR) and with respect to operating the plant (final safety analysis report, FSAR) and the planned organizational structure (FSAR).

   b. The applicable activities carried on by the individuals in management having responsibility for radiation protection (PSAR).

   c. Information describing the implementation of policy, organization, training, and design review guidance provided in Regulatory Guides 1.8, 8.8, and 8.10. Information describing any proposed alternatives (PSAR and update in FSAR).

2. Design Considerations

   a. Information describing how experience from past designs and from operating plants has been used to develop improved radiation protection design (PSAR and update in FSAR).

   b. Information describing the implementation of the design guidelines of Regulatory Guide 8.8, Section C.2, and other industry-developed

design guidance that includes ALARA criteria. Information describing any proposed alternatives (PSAR and update in FSAR).

3. Operational Considerations

   a. The methods of planning and accomplishing work, including interfaces between radiation protection, operations, maintenance, planning, and scheduling.

   b. The use of operating plant experience in planning the operational considerations for plant designs (PSAR and update in FSAR).

   c. Information describing the implementation of radiation protection programs, and operational guidance of Regulatory Guides 8.8 and 8.10. Information describing any proprosed alternatives (PSAR and update in FSAR).

4. Radiation Protection Considerations

   In accordance with the guidelines of Item III.D.3.1 of NUREG-0718, the applicant should commit in the PSAR to provide a Radiation Protection Plan consistent with the provisions of NUREG-0761.

II. ACCEPTANCE CRITERIA

The information provided in the SAR is acceptable if it meets the requirements of 10 CFR Part 50, §50.34 and if it contains sufficient information identified in Section 12.1 of Regulatory Guide 1.70 so that the relevant requirments of 10 CFR Parts 19 and 20 are met. The relevant requirements are:

1. 10 CFR Part 19, §19.12 - "Instruction to Workers"

   As it relates to workers entering restricted areas being kept informed as to the storage, transfer, or use of radioactive materials or readiation in such areas, and instructed as to the risk associated with occupational radiation exposure, precautions and procedures to reduce exposures and purpose and function of protective devices employed.

2. 10 CFR Part 20, §20.1(c) - "Purpose"

   As it relates to persons involved in licensed activities making every reasonable effort to maintain radiation exposures as low as is reasonably achievable (ALARA).

The following regulatory guides and NUREGs provide information, recommendations and guidance and in general describe a basis acceptable to the staff for implementing the requirements of Sections 19.12 and 20.1(c).

1. Regulatory Guide 1.8 - "Personnel Selection and Training," as it relates to a basis acceptable to the staff for complying with the Commission's regulations with regard to the qualifications of radiation protection personnel.

2. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operational)," as it relates to compliance with the Commission's quality assurance regulatory requirements during nuclear power plant operations.

3. Regulatory Guide 8.8 - "Information Relevant to Insuring that Occupational Radiation Exposures at Nuclear Power Stations will be as Low as is Reasonably Achievable," as it relates to a basis acceptable to the staff for meeting the requirements of 10 CFR Part 20.1(c) by providing radiation protection information pertaining to actions taken during the design, construction, operation, and decommissioning to assure that occupational radiation exposures are kept ALARA.

4. Regulatory Guide 8.10 - Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as is Reasonably Achievable," as it relates to a basis acceptable to the staff for meeting the requirements of 10 CFR Part 20.1(c) concerning the commitment by the applicant's management and vigilance by the Radiation Protection Manager and the radiation protection staff to maintain occupational radiation exposures ALARA.

5. NUREG-0718 - "Licensing Requirements for Pending Applications for Construction Permits and Manufacturing Licenses," Item III.D.3, Radiation Protection Plan, as it relates to preparation and maintenance of a current Radiation Protection Plan.

6. NUREG-0737, "Clarification of TMI Action Plan Requirements," as it relates to implementing Task Action Plan Items II.B.2 and II.F.1(3) for CP and OL applications.

7. NUREG-0761 - "Contents of Radiation Protection Plans for Nuclear Power Reactor Licensees," as it relates to guidelines for the content of a Radiation Protection Plan and elements to be included in a comprehensive radiation protection program as well as procedural details and outlines for incorporation into implementing procedures.

Specific Acceptance Criteria necessary to meet the regulations and the guidelines of the Regulatory Guides and NUREGs identified above are as follows:

1. Policy Considerations

   Acceptability will be based on evidence that a policy for assuring that ORE will be ALARA has been formulated in accordance with the training requirements in 10 CFR Part 19, §19.12 and, the ALARA provisions of 10 CFR Part 20, §20.1(c), and that the policy has been described, displayed, and will be implemented in accordance with the provisions of Regulatory Guides 8.8 and 8.10 (c.1), and NUREG-0761 (Sections 5), as it relates to maintaining doses ALARA. A specific individual(s) will be designated and assigned responsibility and authority for implementing ALARA policy. Alternative proposed policies will be evaluated on the basis of a comparison with the above Regulatory Guides and NUREG-0761.

2. Design Considerations

   Acceptability will be based on evidence that the design methods, approach, and interactions are in accordance with the ALARA provisions of 10 CFR Part 20, §20.1(c), and Regulatory Guide 8.8, and will include incorporation of measures for reducing the need for time spent in radiation areas; maintenance; measures to improve the accessibility to components requiring periodic maintenance or inservice inspection; measures to reduce the production, distribution, and retention of activated corrosion products throughout the primary system; measures for assuring that ORE during

decommissioning will be ALARA, reviews of the design by competent radiation protection personnel; instructions to designers and engineers regarding ALARA design; experience from operating plants and past designs; and continuing facility design reviews. Alternative proposed design policies will be evaluated on the basis of a comparison with the design guidance in Regulatory Guide 8.8 (c.2).

3. Operational Considerations

Acceptability will be based on evidence that the applicant has a program to develop plans and procedures in accordance with Regulatory Guides 1.33, 8.8, and 8.10, which can incorporate the experiences obtained in facility operation into facility and equipment design and into operations plannning and which will implement specific exposure control techniques.

4. Radiation Protection Considerations

Acceptability will be based on evidence that the Radiation Protection Plan has been prepared in accordance with the guidelines of Task Action Plan item II.D.3.1 and supplemented by NUREG-0761, including criteria, concepts, and implementation schemes to be included as part of operational radiation protection programs for power reactors.

## III. REVIEW PROCEDURES

The information furnished in the SAR is reviewed for completeness in accordance with Regulatory Guide 1.70. RAB reviews the management policy and the planned organizational structure to determine how the guidance given in Regulatory Guides 8.8, 8.10, and 1.8 will be implemented, and considers any alternatives proposed. The review of organization structure includes a determination of whether the individuals responsible for the radiation protection program are on a high enough level of management to assure independence from operating pressures, and implementation of management's commitment for assuring that ORE will be ALARA and that radiation protection management has direct access to station management in radiation protection matters. Any concerns regarding organizational structure as related to the radiation protection manager will be communicated to the Licensee Qualification Branch, which has primary review responsibility for this item, in Chapter 13. The reviewer uses NUREG-0731 for additional guidance on acceptable operating organizations.

The reviewer evaluates information in this section in accordance with Regulatory Guide 8.8, Section C.1.b.(3), to determine whether the organizational structure provides a mechanism for the radiation protection manager and the radiation protection organization to interact with design review groups in such a manner that methods and techniques for reducing ORE will be incorporated in the design of the plant. If the future plant Radiation Protection Manager has not yet been selected, design review should be accomplished in accordance with the guidance of Regulatory Guide 8.8, unless acceptable alternatives are proposed. The reviewer determines that appropriate personnel with operating plant experience have reviewed the proposed plant design. The reviewer determines from information furnished whether the applicant has incorporated previously accepted design features and has used operating experience to improve the design of the plant with regard to assuring that ORE will be ALARA. The reviewer evaluates the material in this section against the requirements of 10 CFR Part 20 and the guidelines of Regulatory Guides 8.8 and 8.10.

Based on this staff review, RAB may request additional information or request the applicant to modify his submission in order to meet the acceptance criteria given in subsection II.

## IV. EVALUATION FINDINGS

The staff's review should verify that sufficient information has been provided in the SAR and amendments to meet the requirements of 50.34 to support conclusions of the following type, to be included in the staff's Safety Evaluation Report:

> The staff concludes that the ALARA policy, design and operational considerations are acceptable. This conclusion is based on the applicant having met the training requirements of 10 CFR Part 19, §19.12, and the ALARA provisions of 10 CFR Part 20, §20.1(c), Regulatory Guides 8.8 and 8.10(c.1), and the guidelines of Task Action Plan Item III.D.3.1 of NUREG-0718 for PSARs supplemented by the guidance of NUREG-0761.
>
> The applicant provides a management commitment to assure that (plant name) will be designed, constructed, and operated in a manner consistent with the above criteria. The (title of person or group, e.g., Plant Health Physicist and staff) periodically reviews, updates, and modifies as appropriate plant design features and changes, as well as all operating and maintenance features, using exposure data and experience gained from operating nuclear power plants, in order to insure that occupational exposures will be kept as low as is reasonably achievable in accordance with Regulatory Guide 8.8 criteria.
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> The objective of the plant radiation protection design is to maintain individual doses and total person rem doses to plant workers, including construction workers, and to members of the general public as low as is reasonably achievable, and to maintain individual doses within the limits of 10 CFR Part 20. Within restricted areas all plant sources of direct radiation and airborne radioactive contamination are considered in our review.
>
> (Utility) will incorporate the following facility and equipment design considerations at (plant name) in order to satisfy the above listed radiation protection design objectives. (List several design considerations used.) These design considerations conform with the guidelines of Regulatory Guide 8.8 and are acceptable.
>
> Operating and maintenance personnel follow specific plans and procedures in order to assure that "as low as is reasonably achievable" goals are achieved in the operation of the plant. Engineering controls for the protection of personnel have been optimized. Operations involving high person-rem exposures are carefully preplanned and carried out by personnel well-trained in radiation protection and using proper equipment. During such maintenance activities, personnel are monitored for exposure to radiation and contamination. Their radiation exposures are reviewed and are used to make changes in future job procedures and techniques. The management staff reviews radiation exposure trends periodically to determine major changes in problem areas, and to note which worker groups are accumulating the highest exposures. The staff uses these reports to

recommend design modifications or changes in plant procedures. These practices conform with those in Regulatory Guide 8.8 and 8.10 and are acceptable.

## V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides and NUREG's with the exception that NUREG-0761 shall be implemented at a later date in accordance with Commission direction.

## VI. REFERENCES


1. 10 CFR Part 19, "Notices, Instructions, and Reports to Workers; Inspections."
2. 10 CFR Part 20, "Standards for Protection Against Radiation."
3. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."
4. Regulatory Guide 1.8, "Personnel Selection and Training."
5. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operations)."
6. Regulatory Guide 1.70, "Standard Format and Contents of Safety Analysis Reports for Nuclear Power Plants."
7. Regulatory Guide 8.8, "Information Relevant to Assuring that Occupational Radiation Exposures at Nuclear Power Stations Will be as Low as is Reasonably Achievable."
8. Regulatory Guide 8.10, C.1, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as is Reasonably Achievable."
9. NUREG-0718, "Licensing Requirements for Pending Applications for Construction Permits and Manufacturing Licenses."
10. NUREG-0761, "Contents of Radiation Protection Plans for Nuclear Power Reactor Licensees."